In re Appln. of HOSONO et al.
Application No. 09/871,976

REMARKS

In response to the Official Action mailed May 7, 2003, Applicants amend their application and request reconsideration.

An Information Disclosure Statement was filed July 10, 2003. An indication of consideration of the two cited references in the next communication is respectfully requested.

It is proposed in this Amendment to cancel claims 2, 4-8, and 10-12. Claim 3 was previously cancelled. Upon entry of this Amendment, claims 1, 9, and 13-20 remain pending.

The invention concerns a carbon material having a particular configuration, on a substrate, deposited in a particular way, and useful as an electron emitter in a field emission device. Of the claims pending upon entry of this Amendment, claims 9-14 are directed to a method of making this novel carbon material. As explained in the patent application, the novel material is prepared only when particular conditions in a plasma deposition process are maintained. In that process, if conditions are not properly controlled, it is possible to deposit a known structure, known as carbon nanotubes. When the novel carbon material is prepared, as described in claims 9, 13 and 14, the deposited structure is a single phase body of carbon that has walls upstanding from a supporting substrate in a net-like arrangement. This material is useful as a source of electrons in a field emission apparatus as defined in claims 15-20.

In this Amendment claims 1 and 15 are similarly amended to describe the body of carbon as having a single phase.[1] These amendments are supported in the patent application, for example, at page 17, lines 4-10. Further, in this Amendment, claims 10-12 are incorporated into claim 9, producing a claim somewhat different from any claim previously presented. Amended claim 9 is supported by the examples provided in the patent application.

According to the Official Action, claims 1-20 were rejected as anticipated by Barton et al. (U.S. Patent 6,403,209, hereinafter Barton). Claims 6, 12, and 14, were stated to be obvious over Barton. It is not fully clear from the Official Action whether these three claims were rejected once or twice. This rejection is respectfully traversed as to the claims now pending. In making the rejection, the Examiner did not acknowledge the cancellation of claim 3 in the previous amendment. In view of the cancellation of claims 2, 4-8, and 10-12 here, the remaining issue is whether Barton describes or suggests every aspect of the remaining claims 1, 9, and 13-20. If Barton does not describe the claimed subject matter, then the rejection is erroneous.

[1] The term "carbon body" is modified to "body of carbon" since the Official Action may have confused or equated the term "carbon body" with a "carbon-containing material".

In citing Barton, the Examiner directed attention to its Figure 13. That figure shows a "porous" layer 82 covered with a conformal coating 88. The porous layer 82 is described as being electrically non-conductive by Barton (see column 15, lines 33-38). According to column 17, lines 15-29, the porous layer 82 "normally consists of ceramic, including glass-like ceramic." A list of candidate materials follows in the cited passage, none of which is carbon in other words, no part of the porous layer 82 could correspond to the body of carbon of the claim. Clearly, in the rejection, the Examiner is relying upon Barton's example described with respect to Figure 13, and other figures of Barton, because that example includes the conformal coating 88 that is "carbon-containing". It is apparent that this conformal surface coating is not on the substrate, as is the single phase body of carbon of the pending claim and, further, that the body that is on the substrate in Barton is not a single phase body. Barton describes at least a two phase body including the carbon-containing conformal coating 88 and the porous ceramic layer 82 that is not carbon.

What is described in Barton is substantially different from the single phase body of carbon including the net-like walls that is claimed in claim 1 and other claims. Thus, Barton cannot anticipate claim 1.

Claims 9, 13, and14 are directed to a plasma process. The only discussion in the Official Action concerning these claims states that process claims 9-11 and 13 "are deemed to be inherent upon the reference of Barton et al. as applied to claims 1-8 above." If this statement is a rejection, it is legally and factually deficient.

While Barton describes numerous processes of forming a porous body with a conformal coating that may contain carbon, none of those processes is a plasma process. The Examiner's attention is directed to Figures 6a-6d, 9a, 9b, 10a-10d, 11a-11d, 12a-12d, 14a-14c, 15a-15c, and 19a-19c of Barton. According to Barton, these figures illustrate all of the processes described in that patent for preparing the material described by Barton. All of these processes are wet processes, either employing a liquid or a colloid. The only processes described in Barton that involve vapor processing, like plasma processing, relate to depositing the conformal coating and are mentioned briefly at column 19, lines 43-46 of Barton. Those vapor processes are sputtering, chemical vapor deposition, and evaporation. Thus, the rejection is factually erroneous because, for Barton to anticipate any of claims 9, 13, and 14, Barton would have to describe, at a minimum, a plasma process for depositing a material. The absence of that description shows that Barton cannot be an anticipatory reference as to claims 9, 13, and 14.

The statement that the process of claims 9, 13, and 14 is "inherent" in Barton betrays an misunderstanding of the doctrine of inherency in U.S. patent law. In order for a property of a material, for example, to be inherent, the property must, by necessity, be present in the

material described. The general concept of inherency, applied in examining patent applications, requires that a property or characteristic or process step relied on in a rejection must necessarily be present in the prior art to support a rejection. A process for making a particular material is never inherent in a description of the material itself unless the material is characterized by the process by which the material is made. There can be no inherent plasma process in the Barton material because none of the processes described by Barton is even slightly similar to the process claimed in claims 9, 13, and 14. Barton never even hints that his material can be made in a plasma process. It is the Examiner's burden to prove inherency. See MPEP 2112. The bald statement that the claimed process is inherent in Barton's material is not proof. Since no proof has been supplied here, the rejection cannot be properly maintained. This rejection could not survive an Appeal.

It appears that claim 12 and 14 were rejected only as obvious over Barton and not as anticipated. However, examined claims 12 and 14 were dependent claims, depending from claim 9. Claim 12 is incorporated in amended claim 9. Thus, the rejection of examined claims 12 and 14 as obvious is founded upon the erroneous assertion that examined claim 9 was anticipated by Barton. There was and is no such anticipation. Therefore, the rejection of examined claims 12 and 14 fails with the failure of the rejection of examined claim 9.

Claims 15-20 are directed to field emission electron sources. Independent claim 15 generally describes such a source as including a single phase body of carbon having a particular structure, the structure that is described in the patent application. Claims 15 and 16 are supported by the portion of the patent application referring to Figures 13-15. The electron source of claim 17 encompasses the embodiment of Figures 17 and 18 of the patent application. The field emission electron source of claim 18 encompasses the embodiment of Figures 19 and 20 of the patent application, the electron source of claim 19 encompasses the structures of Figures 21 and 22 of the patent application, and the electron source of claim 20 encompasses the embodiment illustrated in Figures 23 and 24 of the patent application.

None of claims 15-20 can be anticipated by Barton. In the Official Action, the Examiner stated that claim 15 recites limitations similar to claim 1. This statement is irrelevant to the propriety of the rejection.

Examined claim 1 did not describe a field emission electron source. Barton describes a field emission electron source and shows an example in Figure 1, although the Examiner referred to Figure 13 of Barton, which shows only a smaller part of a field emission device illustrated in Figures 1 and 2 of Barton. In those Figures 1 and 2, the insulating material described as novel by Barton is employed as the separators 24 spacing electron sources 30 from phosphors 32. Barton never describes his high resistivity material as an electron source or as containing carbon, much less as a body of carbon. Barton's high resistivity material

may be an electron sink. Obviously, Barton's material is useless as an electron source. In fact, the high resistivity of that material is exploited by Barton in providing separators between the two substrates that respectively include the electron sources and the phosphors that are excited by the electrons emitted by the electron sources. The direction of travel and the trajectories of electrons are illustrated in Figures 1 and 2 of Barton by lines ending in arrows. While it is indicated in those figures that electrons impact on the separators 24 of Barton's porous material, there is never any depiction in those figures nor any description in Barton itself that electrons are ever emitted by this material. In fact, in order to collect the electrons that impact on the separator material, Barton provides electrodes 48 on that high resistivity material. Those electrodes are used not only for collecting impacting electrons, but also for deflecting and steering electrons transmitted from the sources 30 to the phosphor spot 32.

The rejection is completely erroneous because the body of carbon of the invention, which the Examiner has compared to the non-carbon porous ceramic material of Barton, is, in claims 15-20, "an electron emitting member for emitting electrons". Barton's material does not have this property, characteristic, or ability and is not so described. Thus, Barton does not meet the terms of any of claims 15-20 and the rejection cannot be properly maintained.

Further, to the extent reliance is placed on Figure 13 of Barton, the rejection is erroneous for the same reason the rejection of claim 1 is erroneous. The structure of Barton's Figure 13 includes the "carbon-containing" conformal coating 82. However, that coating is not a single phase body of carbon *on* a substrate. Barton totally fails to describe the subject matter of claims 1 and 15 and cannot anticipate either claim.

Applicants also respectfully point out that claims 17-20 are directed to particular physical structures incorporating the novel single phase body of carbon of claim 15. In spite of the comments appearing within the Official Action, Figure 13 of Barton does not show any structure that is in any way comparable to any of the structures of these claims 17-20. The assertion, with respect to these claims, that Figure 13 of Barton shows an electron emission source is totally erroneous. In Barton, the electron sources are elements 30, shown in Figure 1 and 2 of Barton, but not shown in Figure 13 of Barton. These electron sources are not Barton's porous material.

In erroneously asserting that electrode 52 shown in Figure 13 of Barton is a cathode electrode for supplying electrons, the Examiner made reference to column 1, lines 16-19 of Barton. That description only refers to flat panel displays generally and does not state in any way what element 52 is in Figure 13 of Barton. Element 52 of Barton is described, among other places, in column 10, lines 19-32 of Barton as an electrode that helps form an electric field between the electron sources 30 and the phosphors 32 to deflect electrons passing

therebetween. There is never any suggestion that element 52 is an electrode that supplies electrons to the exceedingly high resistivity porous material described by Barton. The concept that a current of any useable magnitude could be supplied by such an electrode to such a high resistivity material is not consistent with the fundamental physics of the structure, much less with the disclosure of Barton.

The Examiner also repeatedly described element 54 in Barton as a backside extraction electrode, borrowing, quite inappropriately, language of the rejected claims. Element 54 identified in Barton is not an electrode at all. Rather, as described, for example, at column 10, lines 34-41, of Barton, element 54 is a "rough wall face". It is difficult to imagine how the Examiner could conclude that an element so clearly identified in Barton as a hypothetical geometrical surface is an electrode. Moreover, it is impossible to understand how one can consider this face as generating an electric field for extracting electrons from the high resistivity porous ceramic material described by Barton.

The discussion at column 11, lines 5-22 of Barton, to which the Examiner makes reference, is contrary to the Examiner's characterization of what is described there. That passage describes the generation of secondary electrons, which, as known from the elementary physics of the situation, are electrons that are produced in response to electron impact. In other words, referring to Figure 2 of Barton, when a primary electron passes along the path 40 or the path 42 and strikes the porous material described by Barton, other electrons, secondary electrons, may be generated. These secondary electrons are not generated by field emission. In field emission, electrons are "ripped" from a surface, usually a surface with a sharp edge, under the influence of a strong electric field. Barton makes clear, in referring to the primary electrons, that the phenomenon being discussed in column 11 is not field emission. When Barton intends to refer to the field emission phenomenon, for example with respect to the display illustrated schematically in Figure 1 of Barton, the description is quite clear. As in other parts of the Official Action, the rejection is erroneous because of a misunderstanding of Barton or a lack of understanding of the underlying technology. The rejection cannot be properly maintained.

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Reconsideration and allowance of the remaining pending claims, claims 1, 9, and 13-20 are appropriate and earnestly solicited.

Respectfully submitted,

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